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## Refereed papers

# Implementing the National Programme for IT: what can we learn from the Scottish experience?

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### ABSTRACT

The National Programme for IT (NPfIT) promises to revolutionise the delivery of health care by enabling seamless and secure electronic exchange of clinical information within the NHS. Challenges to NPfIT highlighted in the media and academic commentary are common to such initiatives worldwide. This paper offers key messages and recommendations

derived from a comparable electronic clinical communications programme in Scotland, and elsewhere, as a means to aid the implementation process.

**Keywords:** electronic clinical communications, eHealth, information management and technology

## The English context

The ambitious National Health Service (NHS) information technology (IT) plan, announced in 2002, aims to modernise the health service by developing a centralised approach to IT delivery that will improve infrastructure and rationalise the purchasing of systems so as to avoid incompatibility, reduce costs and maximise efficiency.<sup>1</sup> The National Programme for IT (NPfIT) will upgrade information management and technology (IM&T) infrastructure to support a broadband NHS network and deliver national systems to enable electronic care records, transfer of electronic prescriptions and electronic appointment booking. Preliminary scoping and commissioning activities took place between April 2002 and March 2003, and included a number of formative projects conducted under the auspices of the NHS Modernisation Agency, such as the e-bookings pilot.<sup>2</sup> However, the main phase of software development and implementation is at an early stage. It may therefore be instructive to consider experiences and lessons learned from the comparable Scottish programme.

## Issues of concern

Readers of *Informatics in Primary Care* will no doubt be aware of the plethora of recent media reports on the topic of NPfIT, as well as commentaries in the scientific press. In the main these have been highly critical, emphasising the potential failings and risks of the programme.<sup>3–5</sup> Among the issues highlighted have been: for clinicians – fears over the potential utility and reliability of systems, lack of awareness, and resistance to system imposition; for health authorities – uncertainty over long-term financing and implications for existing useful IM&T systems; and from a strategic perspective – lack of clarity over supplier commissioning and interoperability. Other concerns have been voiced at the short timescale available for the current phase, the political motivation for rapid delivery and the potential for cost escalation.<sup>6</sup>

While the type of problems alluded to in the media might strike the casual reader as particularly damning to the NPfIT, it is important to point out that these experiences are far from unique and regularly beset complex civic and commercial programmes across the globe, as attested to by the wealth of books and reports on the topic of IM&T implementation. Nonetheless, awareness of the barriers and facilitators to complex

IT programme implementation remains poor and as a result key safeguards are often neglected. During the comparable programme north of the Border, the Scottish Executive Health Department demonstrated considerable foresight in commissioning a unique participative evaluation process which enabled academic researchers to feed back early observations in order to facilitate its development. Unsurprisingly the programme experienced a range of common barriers to progress, but the open and responsive attitude of government policy makers and implementers to feedback meant that the majority of these were resolved.

## The Scottish context

The Electronic Clinical Communications Implementation Programme (ECCI) was initiated in 2000 with an intended end date of March 2003, later extended to 2005.<sup>7</sup> It is part of the NHS Scotland eHealth Strategy, which includes a commitment to implementing the universal patient identifier, enabling record linkage and thereby integrated electronic health records.<sup>8</sup> The overriding objective of ECCI was to promote the electronic exchange of clinically relevant information between primary and secondary care. It targeted six key 'deliverables' relating to direct hospital outpatient appointment booking from primary care; referral from primary to secondary care; results reporting from secondary care laboratories to primary care; transfer of hospital discharge and clinic letters to primary care; and clinical email (for example, second opinion correspondence). A related objective was to implement integration tools to enable information to be shared between IT systems. At the outset of the programme it had been envisaged that the focus of ECCI would be implementation. A parallel initiative known as Scottish Care Information (SCI) had been separately funded to produce national computing systems for achieving ECCI.<sup>9</sup> Since the English programme is part of a broader strategy incorporating a range of infrastructure, development and implementation initiatives, it is not exactly comparable with ECCI, although the parallels with this and the wider Scottish programme are obvious.

Our research team was contracted to evaluate ECCI between October 2001 and November 2003 and our methods and broad findings are described in detail elsewhere.<sup>10</sup> Summarised here are some key lessons learned from this exercise, and from our more general observations of IM&T implementation.

## Observations, recommendations and lessons learned

### Complex IT projects usually take longer than anticipated and cost more than initially estimated

Delays are inevitable, not just because it can take longer than expected to develop systems with appropriate functionality and interoperability, but also because such systems need to be shown to work in the environments for which they are intended and to meet the needs of the users they are intended to serve and may therefore require several iterations. Achieving the human and organisational change necessary to implement new systems is commonly even more time- and resource-intensive than developing the technology itself.

While it can be understandably tempting for programme planners to forecast early completion, this can put the programme at risk of apparent failure. An unrealistically short timescale has been a very damaging factor in past IT projects that have floundered. In Scotland the two main strands of the national programme were originally intended to complement each other, but difficulties with the development of national software solutions (SCI) delayed the implementation phase (ECCI) by around a year. The extra time was not wasted in that most teams used it to address infrastructure issues and many developed unique solutions to achieving the deliverables. However, the hiatus between strategy phases generated additional resource demands since money and teams had been committed to the project based on the original time-frame. The delay also threatened the morale of ECCI project teams, whose initial goals were frustrated and whose immediate objectives had to be modified. Furthermore, it risked reversing the motivational effects of early awareness-raising activities conducted with health professionals. These problems were limited by an active process of information sharing between project teams, facilitated by central staff, which offered peer support to regional implementation personnel and provided an opportunity for interim solutions to be disseminated.

It should also be borne in mind that even once systems are ready to be used and have been installed, there may be a considerable 'cranking-up' phase, where progress is slow but users are preparing and adapting to new ways of working. In ECCI, early expectations of rapid progress were not met and implementation was instead characterised by a very gentle incline, which gained momentum only after some time. Nonetheless, impressive gains in users' readiness to adopt new technologies were evident at a relatively early stage.<sup>10</sup>

## Never underestimate the complexity of a multi-faceted programme

While ECCI was originally envisaged as a roll-out of an integrated SCI product suite, the delay in national systems passed the onus onto the 16 individual Scottish regions to find their own solutions. In light of their competing priorities and their differing local advisory structures, cultures and IM&T infrastructures, each chose to prioritise the six deliverables according to their own perceived needs and interests. Moreover, some chose to enhance their existing emerging systems, others to develop new systems and others to purchase commercial packages. Thus, from a smaller conceptual hub, a potential 96 different IM&T sub-projects became possible. Whilst overlap and the emergence of successful national solutions limited technological proliferation, there was nonetheless wide variability in the nature of ECCI across regions during the programme's official time-frame. Tracking this represented a challenge for central management and external evaluation. Policy makers need to plan for the emergence of unexpected complexity by ensuring that budgets make provision for adequate human resources. In Scotland, rationalisation of systems is occurring as the new national products come into place. The English experience might be less painful if a clear national product suite has been adequately developed before implementation is expected, but regional variation should still be anticipated. Nonetheless, it should be borne in mind that in managing a successful change there is a trade-off to be made between the benefits of supplying new centrally developed solutions to aid standardisation and the costs of abandoning existing local technologies with which stakeholders are familiar and that work well. In the case of ECCI, a few sites had well-established IM&T strategies incorporating approaches to achieving the nominated deliverables. These existing and emerging approaches were boosted by ECCI finance, but this further adhered some regions to their local bespoke solutions. Encouraging interoperability between systems should ensure that when this situation arises in England the local and national systems will work in harmony, although the challenges of implementing appropriate standards should not be underestimated.

## Target realistic and timely outcomes

As with politically attractive time-scales, the temptation to over-promise on the projected benefits of a new programme should be avoided. Importantly, it might be premature to predict significant effects on clinical outcomes or process latency. In the case of ECCI, early forecasts of reduced waiting times and improved patient experiences gave way to more realistic

expectations relating to stakeholder engagement, system roll-out and changes in professional ways of working. Larger benefits could take many months or years to become evident, and a great deal of effort might have to be expended simply to modify working practices. In the early stages of technology implementation the cognitive demands of learning new systems might even suppress efficiency and effectiveness, with gains not becoming evident until new ways of working have been established.

## Avoid raising stakeholder expectations unrealistically

In implementation programmes focused on changing professional behaviour there is a tension between, on the one hand, convincing your target group of the benefits their efforts will reap and, on the other, raising expectations unrealistically. Caution should be exercised when promising early benefits, since failing to fulfil stakeholder expectations in a timely manner can lead to dissatisfaction. In ECCI, outreach exercises designed to raise the expectations of clinical stakeholders and thereby increase receptiveness to new systems threatened to backfire when the promised systems failed to materialise or the functionality or performance of prototypes were not as users had envisaged. The nature of any likely benefits should also be made clear early on, so as to avoid later disappointment. For example, in ECCI, rapid electronic access to laboratory results was perceived to be convenient, desirable and a potential universal 'quick win', as it involved less cultural change and appeared less technically demanding than other applications. However, it was not thought to offer any substantive benefit in terms of primary care delivery over paper-based reports, which arrived at most practices within 24 hours. Similarly, it was remarked that electronic booking did not guarantee an earlier consultation and urgent appointments could be booked as quickly using the telephone.

## Involve end-users early in the process of developing new systems and act on their feedback

Failure to engage end-users in the process of developing new systems is a classic mistake in design projects. While the stereotype of remote technocrats developing complicated gadgets that ordinary people can't operate is perhaps outdated, there is nevertheless a tendency for bunker psychology to operate in large-scale IT development programmes, particularly where intellectual property is an issue or where time pressures and sponsors demand rapid solutions and human

resource constraints discourage communication. Ignoring end-user involvement is like galloping towards the finishing line without testing the track beforehand; it can have damaging consequences which could defeat the initial objective. Involving potential users in the design of systems can help programmers to better address stakeholder needs, test systems for their usability and functionality so as to avoid potentially expensive glitches post-roll-out, and engender a sense of ownership which can facilitate implementation.<sup>11</sup> This is especially important in complex domains such as health, where comprehensive and detailed user requirements are rarely established before development work starts.

The Scottish experience suggests that rapid application development with insufficient user input produces sub-optimal systems that engender negative stakeholder attitudes and that only by seeking and actively addressing input from end-users both in the test environment and in ecologically realistic settings can functional and acceptable systems be created. As the Scottish Executive Health Department IM&T Directorate correctly recognised early in the process, the people, not the technologies, are the key issue for implementation. This was evidenced by positive responses to emerging systems that were actively piloted with users, as compared to more advanced ones that were simply rolled out. This is in line with frequent observations, in the medical informatics literature, of stakeholder resistance to (and even active sabotage of) systems which they perceive have been imposed upon them. Clinical and allied staff should be actively engaged at all stages of the national programme and should not be regarded as the final cog of implementation.

## Ensure communication and integration between related programmes

In a complex programme there needs to be good communication between separate but complementary initiatives in order to harmonise activities and avoid duplication of effort. Before it became apparent that there would be a delay in the provision of national products, the programme funding for ECCI had been committed to local health boards, necessitating an earlier than ideal start. Furthermore, pressure on the ECCI management team to deliver a massive and highly complex programme meant that the potential benefits of sharing strategies with a parallel redesign programme (for example, process mapping) were not sufficiently explored, particularly in the early stages. The English strategy should contain a commitment to actively engage with related programmes in order to capitalise on mutually beneficial activities.

## Clarify the conceptual nature of the programme

While ECCI was originally conceived of as an implementation programme, it rapidly evolved to become a *development* and implementation programme, with the balance of each varying across health boards according to differences in existing technical infrastructure and IM&T support services. Staff charged with implementing a new initiative will feel more confident if the parameters of their task are clear from the outset. In ECCI some regional teams found themselves heavily involved in development initiatives, including SCI. This was inevitable and had obvious benefits in terms of ensuring integration of the sister programmes, but where development issues dominated, key implementation activities, like organisational development and training, dropped further down the agenda, with consequences for stakeholder engagement. Moreover, while ECCI and SCI were conceived as different programmes, and our research team was explicitly contracted to look at the former, our observations revealed that the fate of ECCI was inextricably entwined with that of SCI. The message for NPfIT is that developers and implementers need to communicate at every stage in order to capitalise on a shared vision. Nonetheless, provided the changes can be fully justified, programme co-ordinators should not be overly alarmed if the nature of an evolving programme takes a different shape to the one originally envisaged, and should adopt an open, self-reflective attitude, recognising the changes rather than adhering rigidly to the original description. For example, in the case of ECCI, pilot work with secondary care staff revealed that the original vision of ubiquitous airline-style booking of hospital appointments from general practice surgeries was not feasible or acceptable, although the concept was applicable under certain circumstances such as non-urgent appointments to particular specialties in specific hospitals. To reflect this, the ECCI vision was reviewed and redrafted such that electronic booking became an optional deliverable rather than a central criterion for success.

## When commissioning evaluation research, recognise what can and cannot be demonstrated in the timescale and budget that you are considering

Expecting an external evaluation team to produce data to justify expenditure on a programme is fraught with difficulties. Care should be taken when designing competitive tenders not to stipulate the assessment of inappropriate or undemonstrable outcomes and

benefits. Depending on their scope and relative duration, complex IM&T programmes will progress through various stages along a continuum (sometimes referred to as a technology cycle) which, over time, addresses issues like concept development, needs assessment, baselining, prototyping, infrastructure evolution, usability testing, awareness raising, skills raising, process re-engineering and so on, only later moving towards widespread implementation. The objectives addressed at each stage will be different and hence different research questions and methods will be appropriate for evaluating their success. For example, improvements in cost-effectiveness or efficiency are only likely to become evident post-implementation and qualitative evaluation methods might be more appropriate in the formative phases. It was recognised early in the ECCI evaluation that the primary objective of the programme was to replace paper with electronic means of communication and it would be unrealistic to expect major outcome changes, certainly in the short term. Furthermore, it was evident that a detailed analysis of time-based and quality measures would necessitate far greater manpower than was available to the research team, and could only be achieved by utilising routinely collected datasets or seeking local data collection from regional project teams. Exploratory discussions with the Information and Statistics Division of the Scottish NHS revealed that the former were unsuitable for demonstrating the desired outcomes. A Delphi process with regional ECCI project teams produced agreement to submit monthly returns for measures of 'readiness' (for example, systems in place, users trained to use systems) and 'use' (such as percentage of clinics or practices using the new system, numbers of electronic versus paper transactions). However, regional teams were not amenable to collecting data that might, in the future, enable demonstration of changes in efficiency and quality, due to the necessary time demands. Selected results from this exercise are reproduced in the paper which accompanies this article, and elsewhere, and the larger datasets are now available in the public domain.<sup>10,12,13</sup>

For the NPfIT, the message is that measuring intermediate outcomes is worthwhile for demonstrating the success of such programmes in the early stages. Ideally evaluation should be approached as a programme of research employing a range of methods and should be supported for the duration of the initiative. This needs to be resourced adequately. Ten percent of budget is often quoted as the industry standard for evaluation of new programmes. No matter how reliable this estimate is, it is clear that healthcare IM&T programmes are, on average, committing less than 1% of their total expenditure to external (or internal) evaluation. Without comprehensive evaluation it will be impossible to demonstrate the value of such programmes to the public and

this shortcoming should be addressed as a matter of urgency. The ECCI evaluation was able to provide a qualitative profile of the programme's evolution and internal variation, develop and collect quantitative measures of implementation, probe end-users' responses to the systems, and facilitate activities via constructive feedback. However, personnel and time restrictions limited our ability to answer important questions relating to cost-effectiveness, quality and efficiency. NPfIT should clarify their needs for evaluation early in the process and take expert advice on task requirements when budgeting for this.

### **There should be openness about the processes of the programme and a willingness to accept and respond to feedback from objective observers**

A classic failing of large-scale civic and industry projects is to adopt a secretive position whereby scrutiny by 'outsiders' is discouraged. This can result in programmes being implemented at vast expense without any objective evaluation being conducted or reported. At the outset of the national programme the Scottish IM&T Directorate made a refreshing break with this tradition by commissioning two independent evaluation projects – one focusing on the ECCI Programme and one on NHS24, the Scottish equivalent of NHS Direct. Our experience evaluating the former illustrated the anthropology of cultural change in this context, as personnel moved from an understandable position of suspicion to one of enthusiastic collaboration. The time-scale for commissioning the evaluation was not ideal in that the research commenced a year after the official programme start date and ended before the implementation had bedded in. Nonetheless, key data collection procedures facilitated by the research team remain in place. Our message for all government departments is that they should foster a culture where evaluation is regarded as a necessary and central part of any new programme and not simply an optional add-on.

Whether evaluation is to be internal or external, programme planners should always build in effective means by which to monitor appropriate outcomes. Comprehensive evaluation should encompass a range of qualitative and quantitative approaches so as to profile the context, culture and process of change as well as to measure its impact. Where appropriate, consideration should be given to incorporating participative evaluation techniques like action research, which facilitate programme development rather than pronouncing judgement at the end. These are compatible with business-derived methods, such as benefits management and continuous quality assessment,

thus easing communication between independent academics and health service managers. It is also important to note that openness is not just about evaluation, but also about sharing information on the project's plans, progress and results with the project team, sponsors and, most importantly, with target users and the public.

## Human factors are as important as technological ones in getting systems into practice

An overarching theme is that changing individual and organisational behaviour is the major challenge of any new IT implementation project. All too often large programmes are destabilised by such things as negative attitudes, persistence with old ways of working, disparate understanding of objectives and processes, poor financial planning and local politics.<sup>14–16</sup> All of these influences were observed to some extent during ECCI but central support, including open forums for sharing difficulties and solutions, along with local project ownership, engagement of regional clinical leads, and organisational development and training initiatives, helped to minimise their impact.

These are by no means the only messages to have come out of the ECCI evaluation and the majority represent general reflections on IM&T implementation and are not specific to this initiative. Despite Scotland's relatively small size and the predominance of a single general practice computing system (GPASS), the programme emerged as a highly complex organism and has encountered a range of obstacles in its lifetime, most of which have been or are in the process of being successfully tackled. Bearing in mind England's larger size and its arguably more diverse population of IM&T cultures, NPfIT is likely to be even more complex and those tasked with its implementation are facing a considerable challenge. We modestly offer these reflections and recommendations in the hope that they might be of some assistance.

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**CONFLICTS OF INTEREST**

None.

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